TENNESSEE STATE UNIVERSITY
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A newly identified longhorned beetle in Tennessee

TUPELO BORER

Aegomorphus morrisi (Uhler)

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The Tupelo borer, *Aegomorphus morrisi* (Uhler), is a member of the longhorned beetle family Cerambycidae (Coleoptera) and is native to North America. This beetle species has recently been found to cause external and internal trunk damage and death to black gum trees in three Tennessee nurseries. This discovery is the first documentation of the tupelo borer occurring in Tennessee.

Photo 3.
Adult Tupelo borer,
Aegomorphus morrisi (Uhler)

How to Identify

Adult Tupelo Borer Beetles

Adult beetles have large bodies (~0.8 to 1 inch long). The beetles have long antennae that are equal to or slightly longer than their total body length. Although beetle coloration may vary, the adult beetle will always have a distinctive M-shaped black marking on its lower, outer wing covering, or elytra **(Photo 3)**. Adult beetles also have an alternating dark and colored pattern that is evident on the antennae and legs.

Identifying Tupelo Borer Larva

Larvae of A. *morrisi* can be found beneath the bark of infested host trees. Larvae have short, dark mandibles. Their soft, cream-colored bodies are 1 to 2 inches long and have large spiracles that run down the length of their abdomen **(Photo 4)**. Larval bodies are covered in coarse to velvety hair-like structures called setae. The first several larval body segments (i.e., regions of their thorax) are the same width as the rest of the body, which has led to this larval characteristic contributing to the common name for the group, collectively called roundheaded borers. By way of comparison, flatheaded borers are another group of wood-boring beetle larvae that also may be found beneath the bark and within the sapwood of some nursery trees. Flatheaded borer larvae may grow up to about 1 inch long and have several enlarged body segments (i.e., thorax) behind the darkened mandibles on the head, which gives them their "flattened head" appearance **(Photo 5)**. At this time, tupelo borer larvae cannot be reliably identified to species on the basis of their morphological characteristics, therefore, adult beetles are needed for proper species identification

Photo 4.
Tupelo borer larva with the first several body segments, the thorax, equal in width as the rest of the body.

Photo 5.
For comparison, a flatheaded borer larva with the first several body segments, the thorax, enlarged relative to the rest of the body.

Tupelo Borer Biology

Adult beetles emerge in mid-June (Craighead 1923). Female beetles deposit eggs on the lower trunks of living black gum or water tupelo saplings (typically ~3 to 5 inches in trunk diameter) (Craighead 1923, Lugger 1884). The larvae feed in the phloem and cambium just below the bark, excavating a feeding gallery. The larvae then bore into the sapwood and heartwood, to create their pupation chambers. The new adults will emerge through a round dime-sized exit hole on the bark in late spring or early summer. The life cycle of this borer species is estimated to require 2 years or longer to transition from egg to adult. Additional monitoring efforts are underway that are expected to inform our understanding of the life cycle and larval behavior of A. *morrisi*.

Geographic Distribution of Tupelo Borer in North America

The tupelo borer, *A. morrisi*, has been reported only from a few widely scattered areas in the eastern United States: Arkansas, Alabama, Florida, Mississippi, Missouri, Pennsylvania, and South Carolina (Holt 2013, Solomon 1995). This species also has been documented in eastern Canada (Solomon 1995). A survey of longhorned beetles collected during more than 15 years of regional trapping efforts, as well as an examination of multiple university and museum collections, did not yield specimens of *A. morrisi* that were collected in TN (Klingeman et al. 2017). Since that report, adult tupelo borer and their larvae also have been collected from managed landscapes and nurseries in middle Tennessee.

Figure 1.
States reported by Solomon 1995 and Holt 2013 to have tupelo borer, *Aegomorphus morrisi* (highlighted in gray), and now Tennessee (highlighted in black).

Host Tree Distribution

Tupelo borer is reported to attack black gum **(Figure 2)** (*Nyssa sylvatica Marshall*; also called black gum or black tupelo) and water tupelo **(Figure 3)** (*Nyssa aquatica L.*) (Solomon 1995). Black gum has the widest U.S. distribution among *Nyssa* species and is a common forest and cultivated nursery tree. Black gum has vibrant red fall colors with various hues of orange, yellow, and purple. This tree species typically have few pest and disease issues, which makes it a favorable, low-maintenance landscape tree. All tupelo species vary from tolerant to very tolerant of wet conditions, also making them favored ornamental plants for wet landscape locations. Tupelo borers are also likely to attack other *Nyssa* species, including swamp tupelo **(Figure 4)**(*Nyssa biflora Walter*), and ogeechee tupelo **(Figure 5)**(*Nyssa ogeche Bartr. ex Marsh.*; also called bee-tupelo, ogeechee-lime, sour tupelo-gum, or white tupelo). To date, however, there are no literature reports about attacks on these tree species.

Figure 2.
Nyssa sylvatica Ma.
(black tupelo) range.

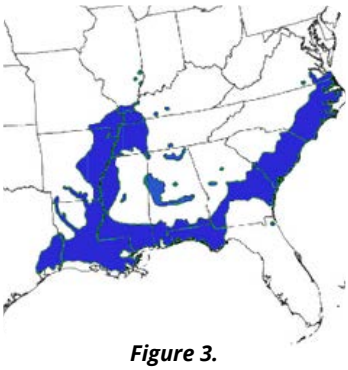


Figure 3.
Nyssa aquatica L.
(water tupelo) range.

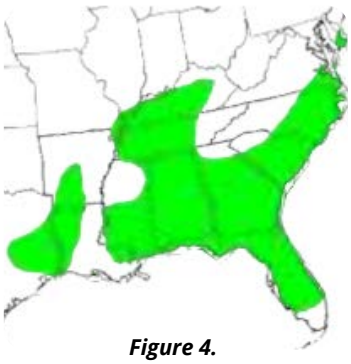


Figure 4.
Nyssa biflora W.
(swamp tupelo) range.

Figure 5.
Nyssa ogeche B.
(ogeechee tupelo) range.

Photo 6. Tupelo borer damage

Tree Injury and Damage

Larval damage by A. *morrisi* results in feeding and gallery excavation-related damage that occurs leaving small to large areas of loosened bark. Sometimes coarse frass may be observed protruding from bark openings **(Photo 6)**. Removing the loose bark will often reveal a large irregular cavity (~2 to 3 inches in diameter) that is packed with fibrous frass. Splitting the wood of an infested tree may reveal the larval feeding gallery and pupation chamber beneath the bark. Depending on the age of the wound, the gallery may vary in size and have a circle-shaped exit hole if the adult already has emerged. Bark scars resulting from previously healed attacks will consist of rather large patchy scars with a small round scar directly above. Attacks have been documented on trunks from ~ 2 to 5 inches in diameter and at heights from ground level to about 6 feet high. The extent to which tupelo borer may become a widespread and established pest problem in nurseries and landscapes has yet to be determined. Only three Tennessee nurseries have reported severe damage, and these instances comprise the first report of this species in Tennessee.

Options for Managing Tupelo Borers in *Nyssa* Host Plants

Although the available literature (Solomon 1995) indicates that tupelo borer beetles can be managed with pesticide sprays or injections into galleries, no insecticide active ingredients have been specified. Trunk injections would be impractical for nurseries due to potential damage of the application method to the trunk, as well as because of the large number of tree specimens involved. Some systemic insecticides (e.g., imidacloprid) may be useful if applied before infestations begin. Trunk sprays of non-systemic insecticides like bifenthrin (e.g., Talstar, OnyxPro), lambda-cyhalothrin (e.g., Scimitar), permethrin (e.g., Perm-Up), chlorpyrifos (e.g., Dursban), etc., could provide control if applied to the full trunk during the adult flight period that begins about mid-June. However, management of the borer with trunk sprays may be minimal after the larva has entered the tree. Trees in nursery production blocks that are already infested no longer represent high-quality salable commercial stock. These infested trees should be culled, removed from the production area, and then chipped, burned, or deep-buried to reduce the threat of infestation of future nursery trees.

What other pest might be attacking my *Nyssa* trees?

Ambrosia Beetles:

The applewood stainer **(Photo 7)**, black twig borer **(Photo 8)**, and yellow-banded timber beetle **(Photo 9)** are all small ambrosia beetles (~1/16 to 1/8 inches [2-3 mm]). Their damage creates small circular entrance holes (shot holes) on the surface of the tree trunk **(Photo 10)** and small tunnels in the tree's interior wood, which are easily distinguishable from the extensive sub-surface tunneling damage caused by the tupelo borer.

Photo 7. Applewood Stainer Beetle *Monarthrum mali* [Fitch]

Photo 8. Black Twig Borer *Xylosandrus compactus* [Eichhoff]

Photo 9. Yellow-Banded Timber Beetle *Monarthrum fasciatum* [Say]

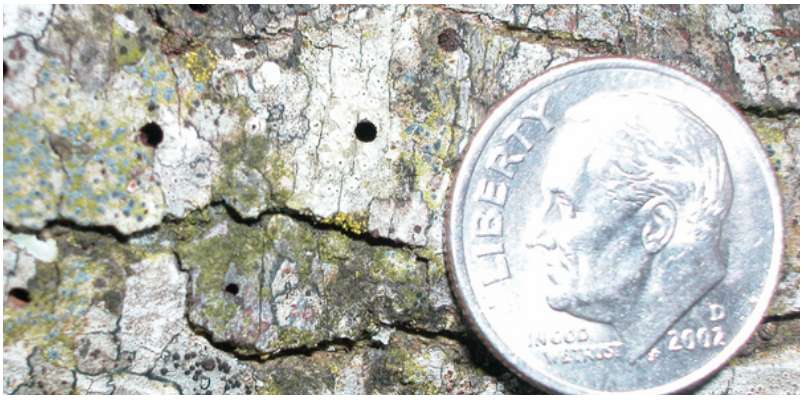


Photo 10
Ambrosia beetle damage of small circular entrance holes (shot holes) on the surface of the tree trunk

Clearwing Moths:

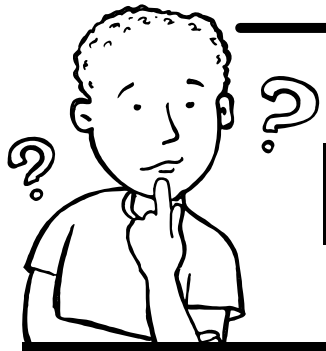
The tupelo clearwing moth **(Photo 11)** could cause sub-surface tunneling damage that could be confused with the tupelo borer. However, the excrement of clearwing borers is typically "pellet-like", and is distinct from the fibrous and string-like excrement of the tupelo borer. Clearwing borer larvae also may leave silk intermixed with the excrement. Clearwing borer larvae also have narrower and less robust bodies than the tupelo borer **(Photo 12)**, and the fleshy prolegs on the abdomen will have crochets on the tips **(Photo 13)**, which are visible with a hand lens. Only moth and butterfly larvae have crochets, so beetle larvae like the tupelo borer will not have crochets on the abdomen.

Photo 11
Tupelo Clearwing Moth *Synanthedon rubrofascia* [Edwards]

Photo 13
Crochets found at the tips of the larvae's fleshy prolegs

Photo 12
Larvae of a tupelo clearwing moth with a narrower and less robust body than tupelo borer

What is attacking my *Nyssa* trees?



Follow this key to aide in determining what pest might be attacking your *Nyssa* crop

What type of damage is occurring on my tree?

Broken or cracked tree trunk with or without frass protruding

Small circular entrance holes

What type of frass is present in or around my tree?

Pellet like frass

Coarse fibrous frass

Tupelo Clearwing Moth
Synanthedon rubrofascia
[Edwards]

Tupelo Borer
Aegomorphus morrisi
[Uhler]

Black Twig Borer
Xylosandrus compactus **[Eichhoff]**

Applewood Stainer Beetle
Monarthrum mali
[Fitch]

Yellow-Banded Timber Beetle
Monarthrum fasciatum
[Say]

All photos were taken by Aubree Morrison & Jason Oliver

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For additional information, contact your local extension office, or

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